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(71) Applicant and
(72) Inventor: **BLUE, Claire** [GB/GB]; Flat 2/2, 4 Battlefield Avenue, Glasgow G42 9HW (GB).

(74) Agent: **MURGITROYD & COMPANY**; 373 Scotland Street, Glasgow G5 8QA (GB).

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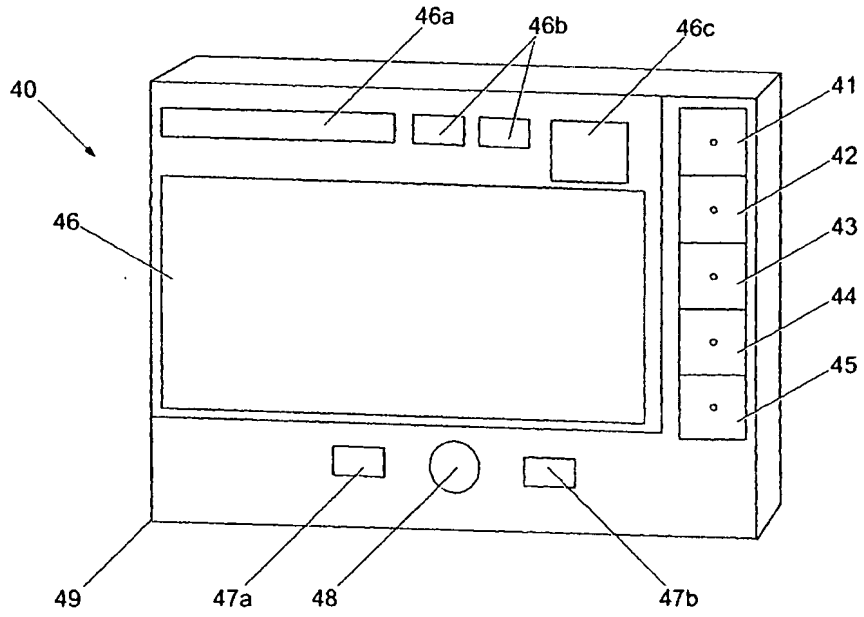
(54) Title: TIME MEASURING DEVICE FOR FEMALE MENSTRUAL CYCLES



(57) Abstract: A time measuring device is provided for the measuring of female menstrual cycles and uses an electronic display means (40). The display means (40) has a housing (49) in which is contained a screen (46) and a number of input buttons (41-45, 47, 48). Each of the input buttons (41-45) prompts a different function to be shown on the screen (46). The display means (40) also contains a known electronic timer circuit (73) for the timing of the menstrual cycle, a microprocessor unit (70) to control the various functions of the display means (40), and a memory (72) in which is stored data from previous cycles.

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TIME MEASURING DEVICE FOR FEMALE MENSTRUAL CYCLES

This invention relates to a time measuring device and more particularly to a biometer for measuring or showing the duration of biological functions such as the length and duration of menstruation.

For most women their menstrual cycle follows a regular pattern of between 28-40 days. The menstrual cycle commences on day 1 of the cycle and lasts for approximately 3-5 days. After menstruation is ovulation, which normally occurs approximately 10-15 days after the onset of menstruation. It is at this time that the woman is most fertile. Following ovulation, menstruation will generally occur again 10-14 days later.

In general, women have to either remember when menstruation is due or keep a note in their diary. Often holidays or special occasions have to be arranged around these days. Additionally, if a woman is attempting to conceive it is necessary for her to calculate from the last menstruation date in her diary when she will be most fertile. Other means are also available for indicating when a woman is at her most

fertile, such as fertility tests - where a sample of urine is tested for hormonal changes - and also blood tests. Both of these tests are time-consuming and not always practical. Furthermore, they can also be expensive as a number of test kits may have to be bought in order to determine the most fertile period of a menstruation cycle.

Another means of keeping a record of the cycle is by the temperature method in which the woman has to keep a daily record of her temperature by taking a reading each morning. A significant difference in her temperature for several days indicates ovulation, thereby further indicating that those are her most fertile days.

The present invention obviates or mitigates the above disadvantages by providing a time measuring device which indicates at a glance to the user their exact stage of menstruation.

According to a first aspect of the present invention, there is provided a menstrual cycle time measuring device comprising:

an electronic timing means;

an electronic data storage means;

a microprocessor;

a plurality of data input means adapted to permit data entry; and

a display means adapted to display data in a data array;

wherein said display means is adapted to switch between a plurality of distinct modes upon operation of one or more of said data input means, a different data set being displayed in each mode;

and wherein said data array comprises a plurality

of display elements, each element showing the data of the displayed data set corresponding to a particular time period.

Preferably, said time period is a day.

Preferably, said plurality of distinct modes comprise one or more of: length of menstrual cycle, user body temperature, user fertility, user pre-menstrual symptoms, and length of pregnancy. Preferably, said electronic timing means is adapted to count the time phase of a female menstrual cycle, updating said length of menstrual cycle display upon the completion of each 24 hour period.

Preferably, said display means comprises a primary display indicating a number of boxes. Most preferably, said primary display indicates 40 boxes.

Preferably, said display means further comprises a number of auxiliary displays.

Preferably, said device further comprises resetting means adapted to reset said electronic timing means upon operation of one of said data input means.

Preferably, said electronic data storage means is adapted to store data accumulated from a plurality of completed menstrual cycles. Preferably, said electronic data storage means stores the data from the completed cycle following operation of said resetting means.

Preferably, said device further comprises an electronic calculation means, said calculation means being adapted to apply a plurality of predetermined arithmetical

functions to the data stored in said electronic data storage means. Preferably, the resultant values of said predetermined arithmetical functions are displayed in one or more of said plurality of distinct modes.

Preferably, said electronic time keeping means continues to count until interrupted by said resetting means.

Preferably, said device further comprises a power source, said power source comprising a removable primary power unit and a secondary power unit, said secondary power unit providing power to said electronic time keeping means and electronic data storage means when said primary power unit is removed.

Preferably, said device further comprises a temperature recording means.

According to a second aspect of the present invention, there is provided a menstrual cycle time measuring device comprising electronic timing means, display means, and input means, wherein said device is adapted to count the time phase of a female menstrual cycle, updating said display means upon the completion of each 24 hour period.

Preferably, said input means is adapted to reset said timing means when said input means is operated.

Preferably, said device is adapted to cover a maximum time period of 40 days.

Preferably, said device further comprises a wrist strap.

Preferred embodiments of the present invention will now be described, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a time measuring device in accordance with a first embodiment of the present invention;

Figure 2 is a perspective view of a time measuring device according to a second embodiment of the present invention;

Figure 3 is a schematic view of a time measuring device according to a third embodiment of the present invention;

Figure 4 is a perspective view of a time measuring device according to a fourth embodiment of the present invention;

Figures 5A-5E are detail views of the distinct function modes present in the fourth embodiment of the present invention;

Figure 6 is a circuit diagram illustrating the operation of the fourth embodiment of the present invention; and

Figures 7(a) and (b) show a flow chart showing a preferred embodiment of the operation program utilised in the fourth embodiment of the present invention.

The present invention provides a time measuring device which is in the form of an electronic organiser or "smart card"-type unit, where the device is provided with a microchip and memory storage facility. However,

alternatively the device may also be in the form of a stopclock, calendar clock, watch, or the like. The device is capable of displaying up to 40 successive days as this is generally the maximum number of days of any menstruation cycle, although it is more common for the cycle to last only approximately 28 days.

In one embodiment of the invention there is provided a calendar clock 1 as shown in Fig 2 which comprises a housing 2 having therein a known timing system. In one face 3 of the housing 2 is a window 4 which contains the means 5 for indicating each successive day of the menstrual cycle. The means for indicating the days comprises a plurality of numbered tabs 5 mounted on a spindle. As the spindle is rotated, the successive numbered tabs 5 register in the window 4. On the top of the housing 2 is a means 6 for resetting these tabs 5 back to day 1. The resetting means 6 is a push button on the top of the housing 2 which selectively engages the spindle with the tabs 5 thereon to rotate the spindle to a rest position thereby resetting the registered tab 5 back to day 1. Also incorporated into the corner of the window 4 can be a digital time display which indicates the precise time of day.

In use of the above embodiment it can be seen to display each successive day from 1 to 40. The calendar clock 1 is reset to day 1 again on the day of menstruation thereby allowing the user to always know the exact day of their menstruation cycle which they are on. This means at a glance that they are able to see when the next menstruation will occur and allow them to plan accordingly. It is envisaged that the clock 1 will also show the actual time of day 7 either along with the menstruation calendar or alternatively if or when desired. This means that the calendar clock

1 can also be used as a conventional clock if desired.

In a further embodiment of the invention there is provided a wrist watch 11 as shown in Fig 3. It comprises a strap 12 and body 13 with a face 14. Within the body 13 is a known time mechanism and on the face 14 around the circumference of the face 14 are the usual numerals 15 depicting the usual 12 hour period. Also provided within the watch face 14 is a window 16 and located below and visible through the same is indicator means 17 capable of being read through the window for indicating which day of the cycle the user is on. Adjacent the member 18 for changing the time is a reset button 19 which when pressed engages the day indicator 17 thereby resetting it back to day 1 in a conventional manner.

A digital watch is also envisaged, which may have a window showing the biological calendar instead of or as well as standard date and time information.

In use of the above embodiment the wrist watch 11 shows the time in the conventional way but instead of, or as well as, the usual day and date calendar mechanism, there is the menstrual calendar 17 which can go up to a maximum of forty days if required. Again the day can be reset back to day 1 each time menstruation begins thereby allowing the user to keep track of the stage they are at by always knowing the exact day they are on of their menstruation cycle. Furthermore, with this embodiment the calendar can be worn on the user's wrist in a discrete manner whilst still allowing the user to tell the time of day as well.

In a yet further embodiment there is provided a stopclock 21, as shown in Fig 1, comprising a housing

22 containing therein a know timing system which moves an indicator means 23 forward by a set amount over a 24 hour period. On one face 24 of the housing 22 is a substantially circular display face 25 having the numerals 26 from 1 to 40 adjacent the circumference thereof. Indicator means 23 in the form of a hand is mounted on the display face 25. There is also a means for resetting the indicator means 23 back to day 1. The resetting means 27 comprises a push button member which when pressed engages the day indicator 26 and returns it to the start day (day 1).

In use the stopclock 21 as described above can either have a normal clock face and the display face above or just the face which shows 1 to 40 successive days around its circumference as shown in Fig 1. The numerals depicting the days can be colour coded for ease of reference. When menstruation begins the clock can be reset back to day 1 again. If day 40 is reached before the onset on menstruation then it is worthwhile carrying out a pregnancy test. It is envisaged that where the invention is a stop clock or calendar clock as described above it could be mounted on a desk in an office environment. For example, where colour coding is used the clock can be left in view without the function of the clock being recognised.

It is further envisaged that the timing device may also be incorporated into a wall mounted calendar. Where colour coding is used the clock can be left in view without the function of the clock being recognised.

In all the preceding embodiments of the invention the numerals depicting the days can be colour coded to show different stages of the cycle so that at a glance the user knows not only what day they are on but also what

particular type of day it is. For example, standard days can be in black, fertile days can be in green and those days which indicate that menstruation is late can be in red. Generally any combination of colours or typescript/font can be used to indicate this difference and in this way it can offer a discrete indication to the user.

Figure 4 shows a further embodiment of the present invention, wherein the time measuring device is in the form of an electronic display means 40, such as a personal organiser-type device or smaller "smart card". The card 40 comprises a housing 49 in which is contained a screen 46 and a number of input buttons 41-45, 47, 48. Each of the input buttons 41-45 prompts a different mode to be shown on the screen 46, and each of these different mode screens are shown in detail in Figures 5A-5E. In addition, the card 40 also has a battery indicator (not shown) which will show when the batteries powering the unit are low. It is envisaged that lithium batteries are used with the card, but other battery types may also be utilised. It is envisaged that the display screen 46 will utilise a liquid crystal display.

The card 40 also houses a known electronic timing circuit which counts the period of time following the start of day 1 of the cycle, and a microchip and memory storage facility which stores information from previous cycles. As with the embodiments described earlier, the card 40 has a reset function operated by a reset button 48 which is operated by the user on the first day of menstruation. In addition the card 40 also has cycle buttons 47a,47b to move forward or back in the cycle shown on the screen 46.

Figures 5A-5E show the detail of the five modes which can be shown on the screen 46. In each of the Figures 5A-5E, it can be seen that the screen 46 contains different data sets which all relay different information to the user. The main area of the screen 46 is divided into forty separate display segments which display the principle data, depending upon which mode the device is in. The displays 46a and 46b are constant through each of the five modes, with display 46a showing the data of the last twelve cycle lengths as stored in the memory of the card 40. Display 46b shows the start date of the cycle currently being counted by the card 40, along with the current calendar date. Display 46c shows a different average number, depending on the mode on the screen 46.

The first mode, as shown in Figure 5A, is the cycle tracker screen and is called up on the screen 46 by pressing input button 41. This mode has a straightforward counter which counts - by way of the known electronic timing circuitry - the days which have passed since the user reset the counter upon menstruation starting. Upon the passing of each 24 hour period from the resetting of the counter, the counter illuminates the next segment of the main display, with each segment showing the number of each day which has passed since the beginning of the cycle, and also the actual calendar date relating to that particular day of the cycle. For easier interpretation of the data on the screen, the counter may show the current day in a different colour to the days which have passed, and each of those passed days may be illuminated in a different colour from the current day. Alternatively, the display may illustrate passed days by using symbols to show that a particular day has passed. If the counter reaches day 40, it may

automatically reset to day 1. Alternatively, the counter may continue to count, with the screen 46 being updated after day 40 to show days 41-80, 81-120, etc. This feature would be of benefit to women with very irregular periods. However, the counter should be reset manually by the user using reset button 48 when the next menstruation occurs. When the reset button 48 is operated, the counter not only resets, but the length of the finished cycle is stored in the memory of the counter. Display 46c shows the average length of the cycles, based on the length of the last twelve cycles, as shown in display 46a, with the data being calculated by a simple arithmetical program which divides the aggregate length of the completed cycles by the number of cycles completed. Alternatively, any other suitable filtering process may be used.

If, when a cycle is in progress, the length of the cycle passes the average length as calculated by the card 40, the segments following the day of average length are shown in a different colour, such as red, or else by way of some suitable marker or symbol. For example, the screen shown in Figure 5A has the display 46c showing the average cycle length as 34 days. Therefore, if the cycle continues after day 34, the segments representing day 35 and beyond will be illuminated in red, thus indicating to the user that the next menstruation is late.

Figure 5B shows the second mode of the card 40. In this mode, the daily temperature data of the user is recorded during the cycle. In order to enter their temperature on a particular day, the user presses button 42 to access the temperature data screen, and then uses the directional buttons 47a,47b to adjust the displayed temperature to that of themselves before

pressing the button 42 again to enter the data in the segment of the screen 46 relating to the particular day of the cycle. In this particular embodiment of the present invention, it is intended that the user takes their temperature independently and then inputs the value into the card 40. However, another embodiment of the present invention may have an attachable thermometer probe for recording the temperature of the user directly in the card 40 and on the screen 46. With this mode, the card 40 stores the highest temperature data in a particular cycle noting the day of the cycle on which the highest temperature occurred. The temperature of a female rises by 1°C during ovulation, and hence the user can use this mode to predict when ovulation is most likely to commence. The pre-programmed microprocessor thus works out the average day of a cycle when the temperature will rise - and hence where ovulation will begin.

Figure 5C shows the third mode of the card 40. In this mode, the predicted days of the cycle in which the user is fertile are shown. It is not intended that the card 40 tests the fertility of the user, but rather that fertility is tested by other, independent means before the user inputs to the card 40. In order to enter a fertile indication on a particular day, the user switches to the fertility screen using input button 43 and then presses button 43 again to register a fertility reading for that particular day. Again, the storage means of the card 40 records the fertile days of the previous cycles and can then predict to the user the days that they will be fertile during the current cycle. In the example of Figure 5C, the display 46c shows the predicted fertile days as days 18-24, and the segments of the main display which represent days 18-24 are illuminated in a different colour (such as green,

for example) to the other segments. Alternatively, another suitable marker or symbol may be used. Thus, if the user and her partner are attempting to conceive, they can plan based on when the user is at her most fertile based on the predictions of the card.

The fourth mode, as shown in Figure 5D, works in the same manner as the third mode of Figure 5C. However, the fourth mode relates data concerning pre-menstrual symptoms (PMS) rather than fertility. Just as with the third mode, the user simply inputs the PMS indicator when she experiences PMS. Again, the storage and calculation mode of the card will predict days where PMS could occur, based on the inputs in previous cycles. Thus, the card 40 will give a degree of forewarning to the user that PMS is possible on particular days.

The fifth and final mode is a pregnancy tracker for use if the user successfully becomes pregnant. The time function of the card is then adjusted to count in weeks rather than days. Thus, the pregnancy tracker then counts the weeks of the pregnancy using the segmented main display 46.

Figure 6 shows a circuit diagram of a preferred circuit arrangement used in the fourth embodiment of the present invention. The circuit is controlled by a standard microprocessor 50 of either 4 or 8 bits. The microprocessor 50 contains a read-only memory (ROM) 51 for the storing of the program, a random access memory (RAM) 52 for data storage, clock/calendar circuitry 53 for timekeeping, and a power management system 54 which protects the data and clock functions of the circuit when the main battery is either low on power or being changed. The microprocessor 50 generates the

information which is to be displayed, accepts input commands from the user and displays the results of these actions. The data derived from the user is stored in the RAM 52, while the control program for the microprocessor 50 is stored in the ROM 51.

The ROM 51 is used to store the program which controls the device. The ROM 51 is normally internal to the microprocessor 50, but may also be external on its own silicon chip. The ROM 51 can be of several different types depending on the manufacturing requirements. The lowest cost option is to have the ROM 51 as a Mask ROM, where the program is part of the microprocessor manufacturing process. Alternatively, the ROM 51 may be an Electrical Programmable ROM where it is programmed post-manufacture, or else an Electrically Electrical Programmable ROM which may be programmed and erased post-manufacture.

The data storage RAM 52 is used to store the information entered by the user and the information calculated or derived by the program. It is therefore imperative that the RAM 52 is constantly powered to retain the stored information. In the illustrated embodiment, the power is provided by two batteries 55,56. The main battery 55 powers all the electronics while auxiliary battery 56 only powers the RAM 52 and clock 53 when the main battery 55 is flat or being changed.

The clock/calendar 53 keeps track of normal time and supplies accurate timing for the measuring of the menstrual cycles. The clock 53 functions in a conventional manner and can either be external or a part of the microprocessor 50. As detailed above, the clock 53 is powered by two batteries 55,56 so that it

will continue to operate when the main battery 55 is low.

The circuit also has a battery management system 54 to regulate battery power consumption. This system 54 reduces power consumption by turning off the display 46 when not required and either slowing or stopping the microprocessor 50 when the device is idle. When battery power is low, the system 54 prevents use of the device but maintains power for the data RAM 52 and clock 53. In this way, after a new main battery 55 is fitted the device will operate with all the stored data still in the RAM 52 and with the clock 53 showing correct timing information.

The display 46 requires electrical drive waveforms on a large number of electrodes, the electrodes being divided into columns and rows. The actual number of columns and rows depends on the size of the display 46 and the individual elements therein. The display 46 requires column and row drivers 57,58 which may either be integral to the microprocessor 50 or else external. The size of the display 46 in the illustrated embodiment is 144 columns by 128 rows, and has three integrated circuits to drive the display 46. The display 46 is a graphics type display with a rectangular array of pixels which can display information in variable formats. An alternative embodiment could use a dedicated unit with symbols in fixed positions that can either be displayed on or off.

Figures 7(a) and 7(b) show a preferred embodiment of the operational program for the device. When the device is first turned on, the program begins at power up stage 70. Here, all the variables and hardware are initialised for the correct operation of the device.

the next step is clock/calendar set 71 where the user enters the correct time and date. The main operating loop begins at the 24 hour check 72 where the program determines whether a menstrual day has passed. This is timed from when the user told the device that the menstrual period had begun. If a menstrual day has elapsed then step 73 updates the counter and any information derived from this. The data used for the displays is also updated. The program then loops back to check 72.

If a 24 hour period has not elapsed, the next step of the program is check 74 where it is checked whether a second has elapsed. If a second has elapsed, then the second, minute, hour, day, month and year counters may be adjusted by step 75. The program then loops back to the check 72. After check 74 is a manual input check 76 which determines whether a manual input has been made by the user. If not, step 77 advances an auto power off counter so that if no keys have been pressed during a predetermined time period, the display 46 is turned off and the microprocessor 50 is placed in low power mode. The program then loops back to check 72. If there has been a manual input, then the program proceeds to step 78 where the auto power off counter is cleared. This step 78 also restarts the timing of user key activity so that the power off time is measured from the last key input. The program then proceeds to display check 79 where a check is made as to whether the display 46 is on. If the display is off, it is turned on at step 80.

The program then proceeds to determine what particular manual input has been made by the user. The first check is a reset check 81 which determines whether the user has pressed the reset button 48. If so, step 82

stores the length of the completed cycle, updates the average and resets the counter. The time of the reset is also stored as it is used to calculate the length of the next cycle. After step 82, the program loops back to check 72. If the reset button 48 was not pressed, then the program continues.

The remaining checks comprise a screen check 83, cursor movement checks 85,87, data entry check 89, option check 91, time set check 93 and date set check 95. If any of these checks determine a particular input by the user, corresponding action steps 84,86,88,90,92,94,96 undertake the required action as can be seen in Figure 7(b). If screen check 83 detects a screen change input from the user, then step 84 changes the screen to that desired by the user. If cursor checks 85,87 detect a cursor movement input, then steps 86,88 move the cursor accordingly and update software pointers to point to the selected data. If data entry check 89 detects that a data entry key is pressed, then step 90 enters the data. The program then checks whether any program options have been set using option check 91. If a change has been made, step 92 enables or disables options accordingly. The final checks 93,95 determine whether the user has set the time or date and steps 94,96 change the time or date if necessary. Once any of steps 84,86,88,90,92,94,96 has been carried out, the program reverts to check 72.

It is intended that the card 40 will store the previous twelve months data in its memory, so that the averages shown in display 46c can be calculated by the calculation circuit. After twelve months, the data is automatically deleted from the card 40. It is also intended that data can be downloaded from the card 40 if necessary, by a doctor, for example. This would

allow medical staff and GPs to access their patients' information and therefore observe the menstrual patterns over a certain phase. One further addition to the card 40 could be a security device in the form of a fingerprint reader. The reader would prevent others accessing the card 40 by only responding to the fingerprint of the user. The reader could be located on the rear of the housing 49, and would need to be accessed each time that the card 40 was switched on.

The advantages of the present invention are that it indicates at a glance to the user their exact stage of menstruation, or else can indicate the likely fertile period or period of PMS within a menstrual cycle. Furthermore, as a card it can be used discretely and stored in a handbag or the like, thereby allowing the user complete confidentiality. It is hoped that one advantage of the invention is that it will make younger women, especially, more aware of their cycles thereby preventing or at least reducing the number of unplanned pregnancies.

It will be appreciated that the above description is of just one preferred embodiment of the present invention. A number of variations to the cycle counter described here are possible. For example, the counter is not restricted to the five input buttons 41-45 shown here. The counter could have only one input button to move between the different screens of the counter which would allow the size of the counter to be reduced. Also, although it is envisaged that the display screen 46 will utilise a liquid crystal display, other screen technology in development or currently used in computing or other fields such as, for example, organic light emitting diodes, may also be used. A further option would be the use of sexual activity indicator on

the fertility screen. As sperm may last for up to five days within the reproductary tracts, an indicator of when that period is over would be useful. If the user had sexual relations, this could be entered into the device and a symbol would appear in the boxes which indicate the following five days. This would then show the user how long it would be until there was no longer any sperm in the reproductary tract.

These and other modifications and improvements may be incorporated without departing from the scope of the invention.

CLAIMS:

1. A menstrual cycle time measuring device comprising:

an electronic timing means;

an electronic data storage means;

a microprocessor;

a plurality of data input means adapted to permit data entry; and

a display means adapted to display data in a data array;

wherein said display means is adapted to switch between a plurality of distinct modes upon operation of one or more of said data input means, a different data set being displayed in each mode;

and wherein said data array comprises a plurality of display elements, each element showing the data of the displayed data set corresponding to a particular time period.

2. A time measuring device according to Claim 1, wherein said time period is a day.

3. A time measuring device according to either Claim 1 or Claim 2, wherein said plurality of distinct modes comprise one or more of: length of menstrual cycle, user body temperature, user fertility, user pre-menstrual symptoms, and length of pregnancy.

4. A time measuring device according to Claim 3, wherein said electronic timing means is adapted to count the time phase of a female menstrual cycle, updating said length of menstrual cycle display upon the completion of each 24 hour period.

5. A time measuring device according to any preceding

claim, wherein said display means comprises a primary display indicating a number of boxes.

6. A time measuring device according to Claim 5, wherein said primary display indicates 40 boxes.

7. A time measuring device according to either Claim 5 or Claim 6, wherein said display means further comprises a number of auxiliary displays.

8. A time measuring device according to any preceding claim, further comprising resetting means adapted to reset said electronic timing means upon operation of one of said data input means.

9. A time measuring device according to Claim 8, wherein said electronic data storage means is adapted to store data accumulated from a plurality of completed menstrual cycles.

10. A time measuring device according to Claim 9, wherein said electronic data storage means stores the data from the completed cycle following operation of said resetting means.

11. A time measuring device according to either Claim 9 or Claim 10, wherein said device further comprises an electronic calculation means, said calculation means being adapted to apply a plurality of predetermined arithmetical functions to the data stored in said electronic data storage means.

12. A time measuring device according to Claim 11, wherein the resultant values of said predetermined arithmetical functions are displayed in one or more of said plurality of distinct modes.

13. A time measuring device according to any of Claims 8 to 12, wherein said electronic time keeping means continues to count until interrupted by said resetting means.

14. A time measuring device according to any preceding claim and further comprising a power source, said power source comprising a removable primary power unit and a secondary power unit, said secondary power unit providing power to said electronic time keeping means and electronic data storage means when said primary power unit is removed.

15. A time measuring device according to any preceding claim, further comprising a temperature recording means.

16. A time measuring device according to any preceding claim, further comprising means adapted to permit the downloading of data from said electronic data storage means to other discrete data storage and display means.

17. A menstrual cycle time measuring device comprising electronic timing means, display means, and input means, wherein said device is adapted to count the time phase of a female menstrual cycle, updating said display means upon the completion of each 24 hour period.

18. A time measuring device according to Claim 17, wherein said input means is adapted to reset said timing means when said input means is operated.

19. A time measuring device according to either Claim 17 or Claim 18, wherein said device is adapted to cover a maximum time period of 40 days.

20. A time measuring device according to any of Claims 17 to 19, wherein said device further comprises a wrist strap.

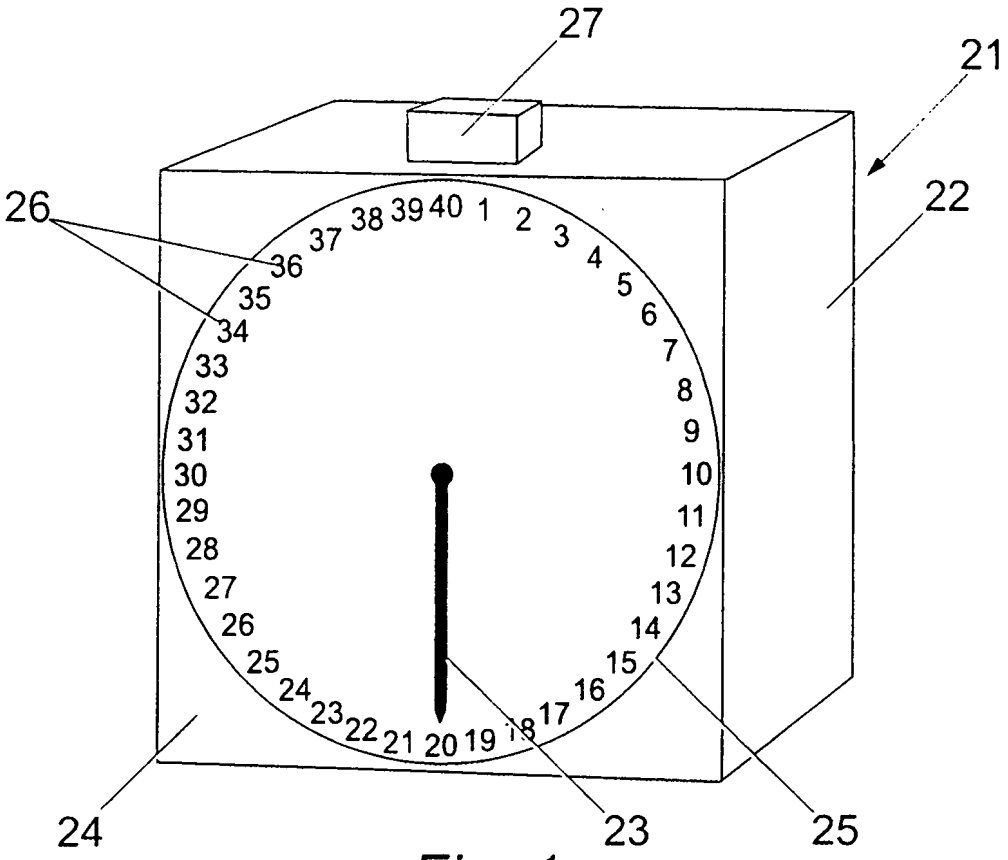
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Fig. 1

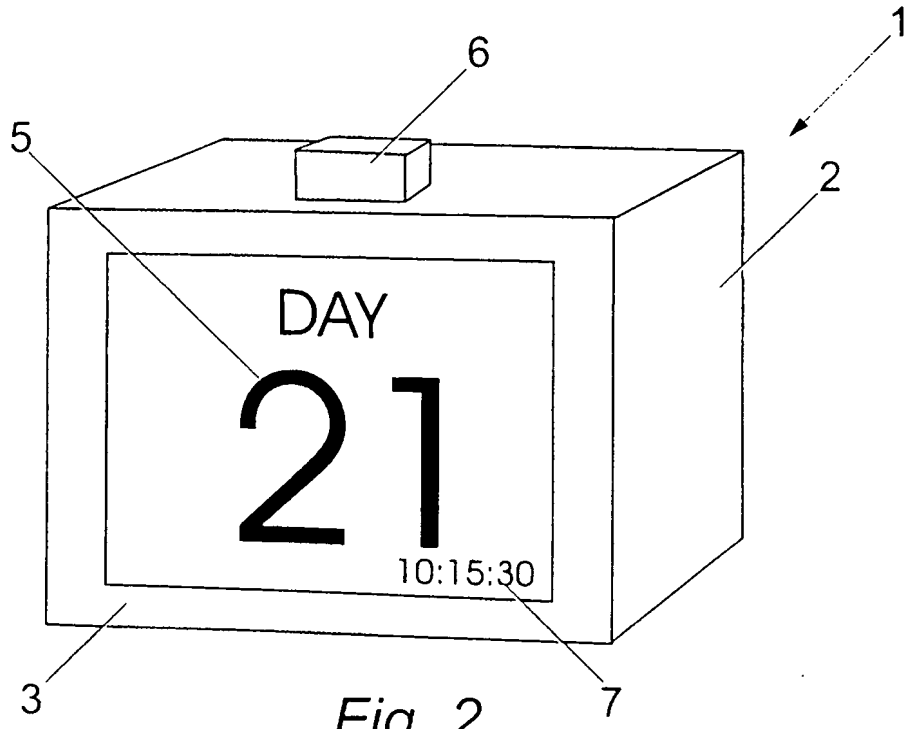
1
6
5
2
DAY
21
10:15:30
3
7

Fig. 2

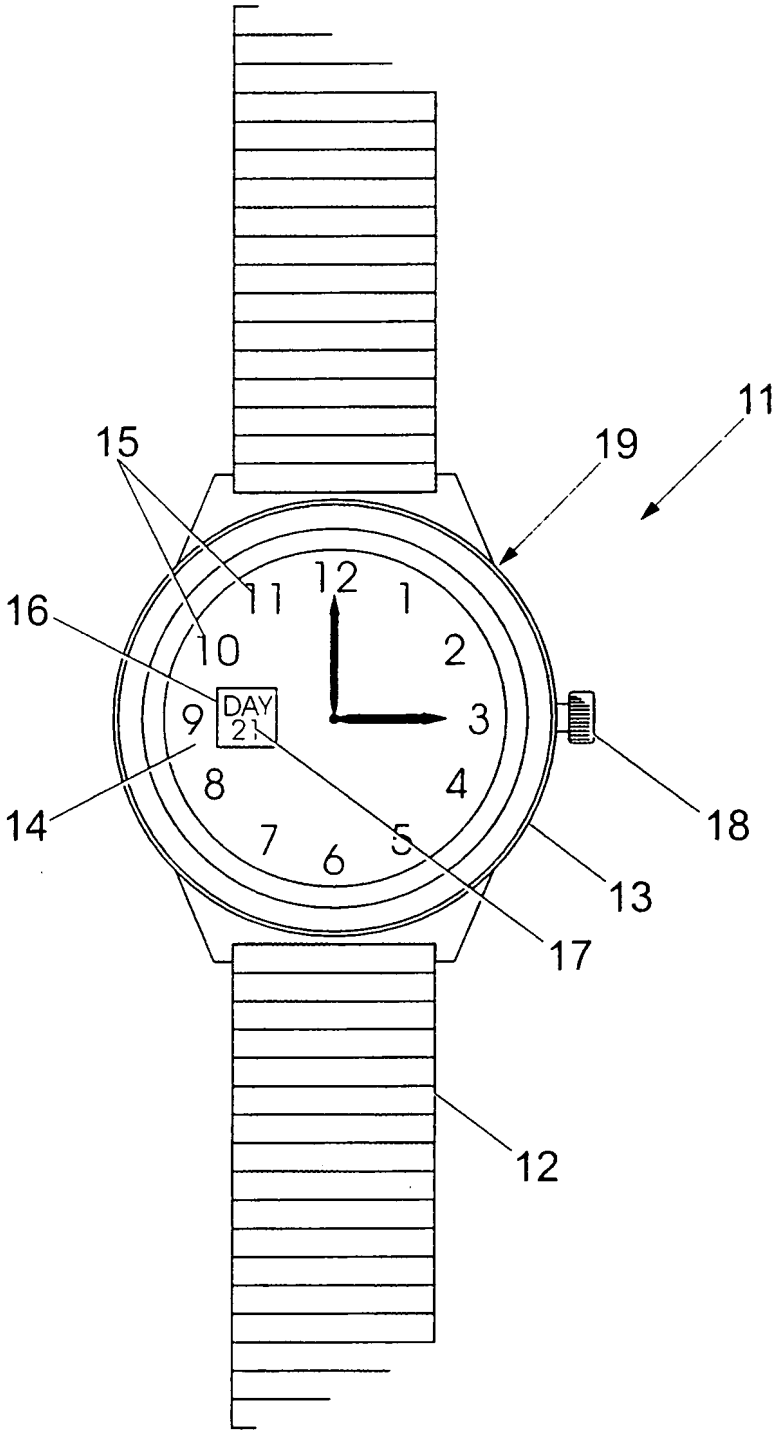

Fig. 3

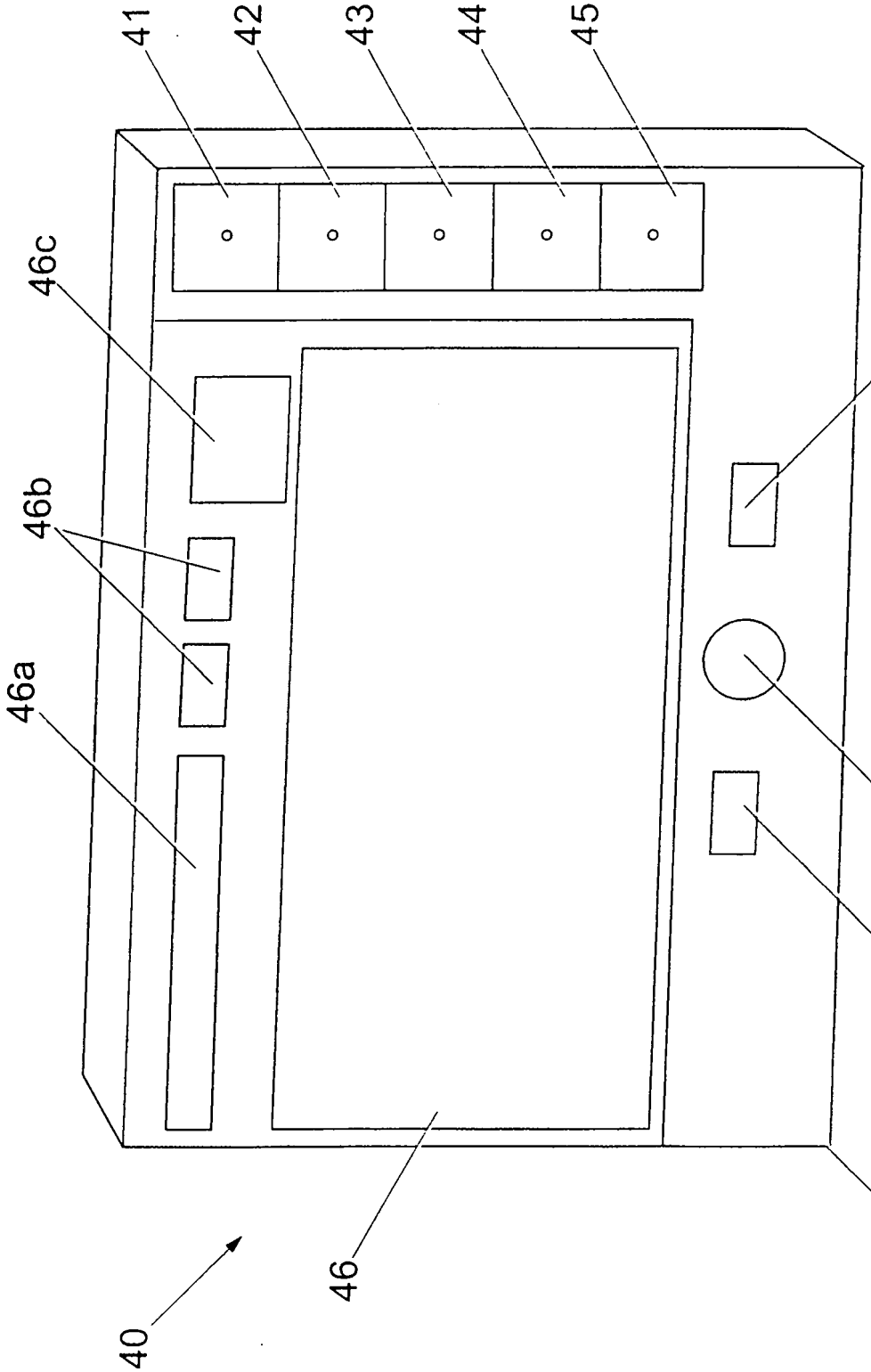

Fig. 4

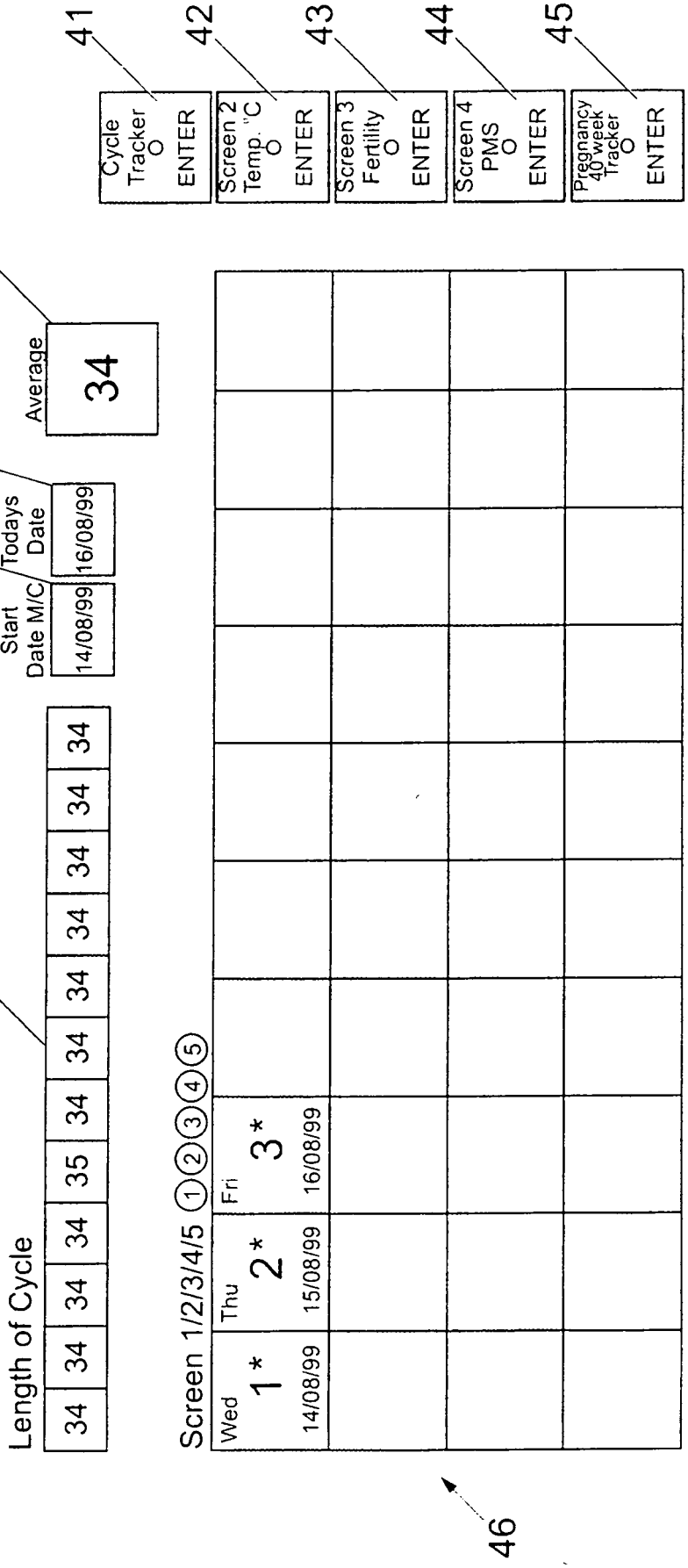
41
42
43
44
45
Cycle Tracker ENTER
Screen 2 Temp. °C ENTER
Screen 3 Fertility ENTER
Screen 4 PMS ENTER
Pregnancy 40 week Tracker ENTER
46c
Average
34
46b
Todays Date
16/08/99
46b
Start Date M/C
14/08/99
46a
Length of Cycle
34 34 34 34 35 34 34 34 34 34
Screen 1/2/3/4/5 ① ② ③ ④ ⑤
Wed 1* 14/08/99
Thu 2* 15/08/99
Fri 3* 16/08/99
BACK
RESET
FORWARD
47a
48
47b
46

Fig. 5a

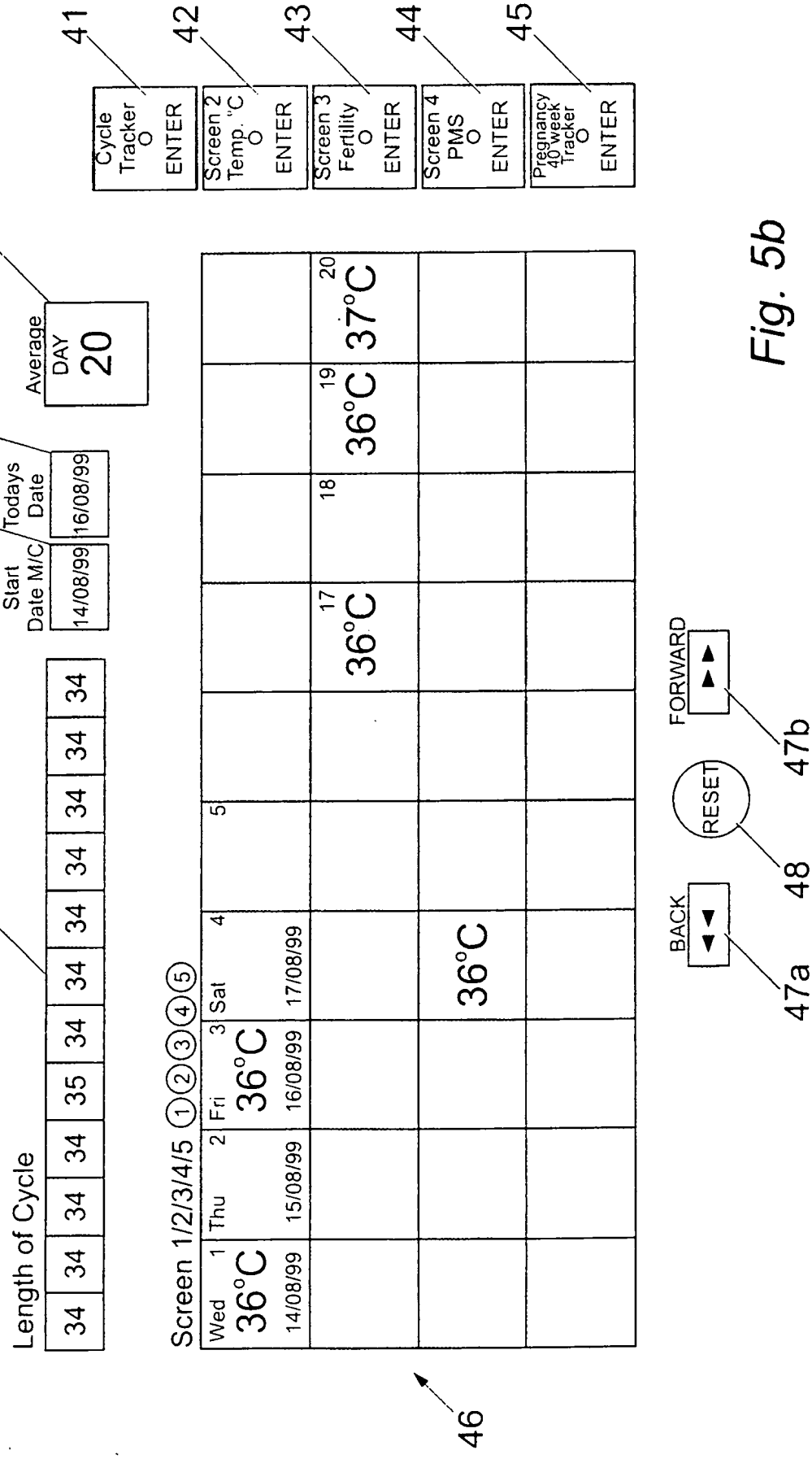
41
42
43
44
45
Cycle Tracker ENTER
Screen 2 Temp. °C ENTER
Screen 3 Fertility ENTER
Screen 4 PMS ENTER
Pregnancy 40 week Tracker ENTER
46c
Average DAY 20
46b
Todays Date 16/08/99
Start Date M/C 14/08/99
46a
Length of Cycle
34 34 34 34 35 34 34 34 34 34 34
Screen 1/2/3/4/5 ①②③④⑤
Wed 1 14/08/99 36°C
Thu 2 15/08/99
Fri 3 16/08/99 36°C
Sat 4 17/08/99
5
17 36°C
18
19 36°C
20 37°C
36°C
BACK
RESET
FORWARD
47a
48
47b
46

Fig. 5b

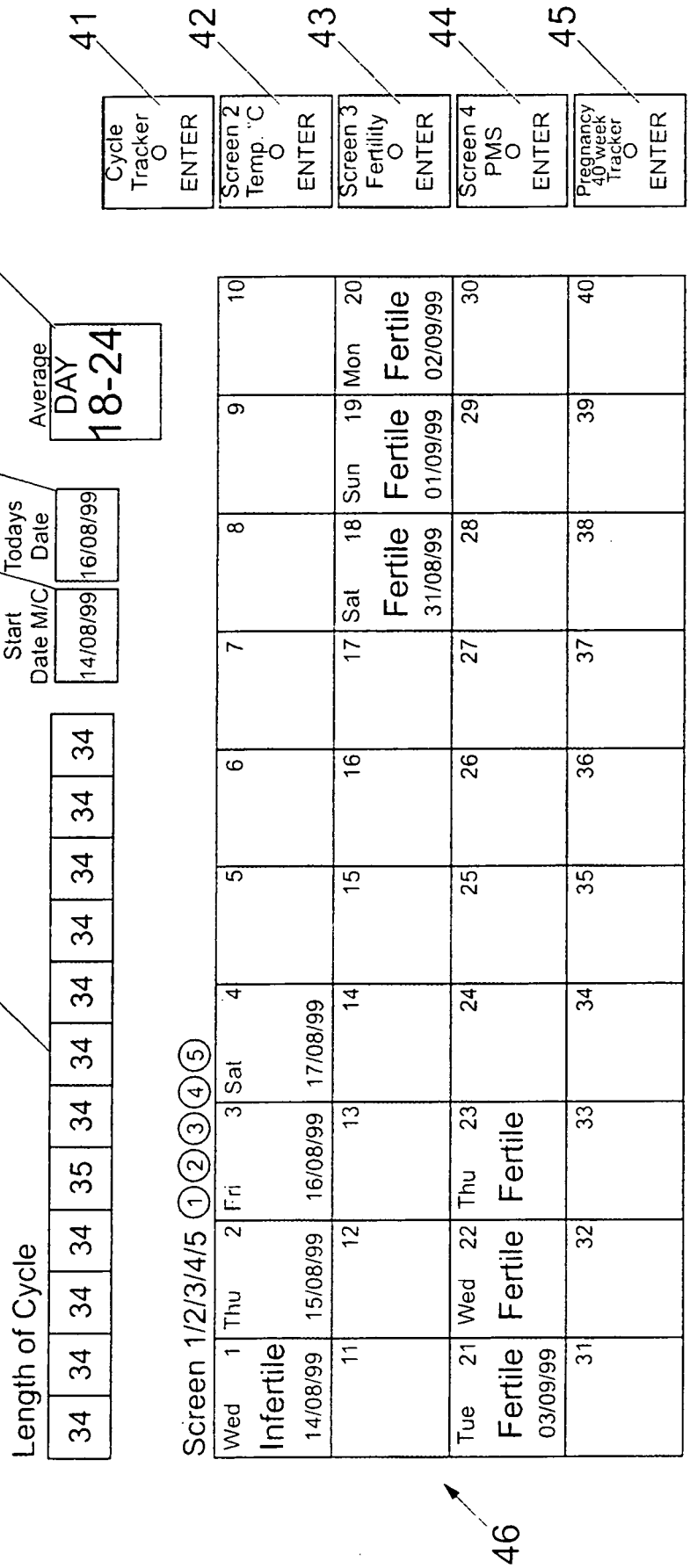
41
42
43
44
45
Cycle Tracker ENTER
Screen 2 Temp. °C ENTER
Screen 3 Fertility ENTER
Screen 4 PMS ENTER
Pregnancy 40 week Tracker ENTER
46c
Average DAY 18-24
46b
Todays Date 16/08/99
Start Date M/C 14/08/99
46a
Length of Cycle
34 34 34 35 34 34 34 34 34 34
Screen 1/2/3/4/5 ①②③④⑤
Wed 1 Infertile 14/08/99
Thu 2 15/08/99
Fri 3 16/08/99
Sat 4 17/08/99
Tue 21 Fertile 03/09/99
Wed 22 Fertile
Thu 23 Fertile
Sat 18 Fertile 31/08/99
Sun 19 Fertile 01/09/99
Mon 20 Fertile 02/09/99
46
BACK
RESET
FORWARD
47a
48
47b

Fig. 5c

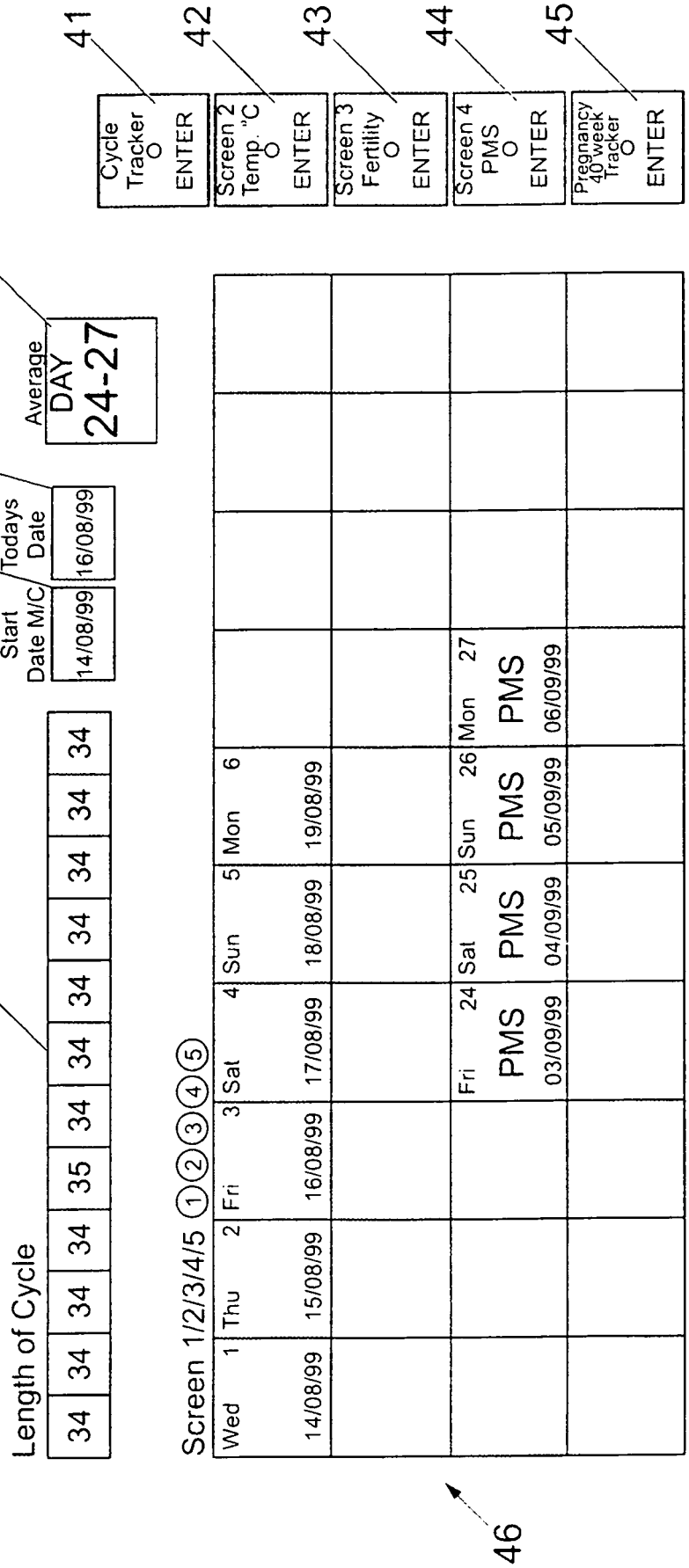
41
Cycle Tracker
ENTER
42
Screen 2 Temp. °C
ENTER
43
Screen 3 Fertility
ENTER
44
Screen 4 PMS
ENTER
45
Pregnancy 40 week Tracker
ENTER
46c
Average
DAY
24-27
46b
Todays Date
16/08/99
Start Date M/C
14/08/99
46a
Length of Cycle
34 34 34 34 35 34 34 34 34 34
Screen 1/2/3/4/5 ①②③④⑤
Wed 1 14/08/99
Thu 2 15/08/99
Fri 3 16/08/99
Sat 4 17/08/99
Sun 5 18/08/99
Mon 6 19/08/99
Fri 24 PMS 03/09/99
Sat 25 PMS 04/09/99
Sun 26 PMS 05/09/99
Mon 27 PMS 06/09/99
BACK
RESET
FORWARD
47a
48
47b
46

Fig. 5d

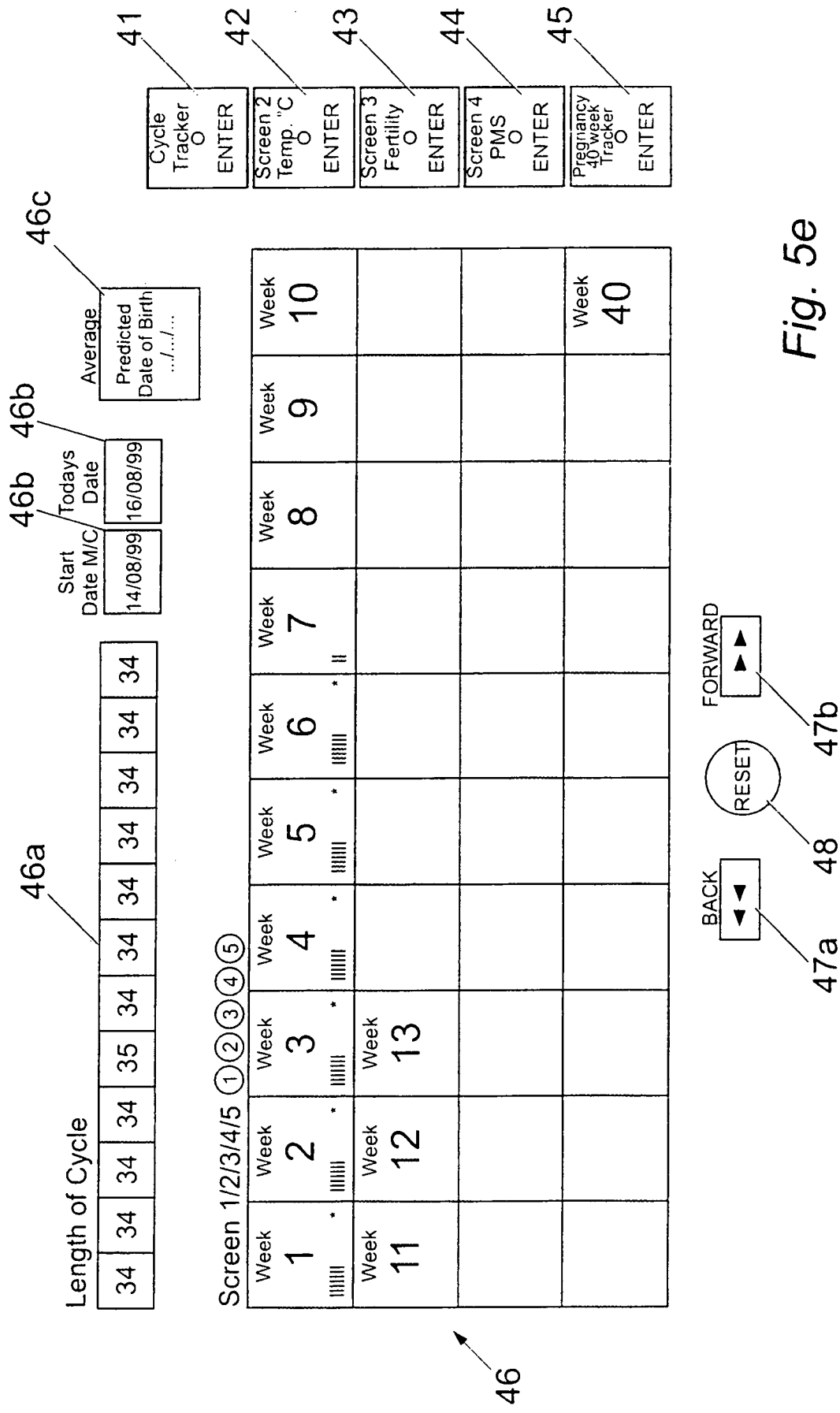
41
42
43
44
45
Cycle Tracker ENTER
Screen 2 Temp. °C ENTER
Screen 3 Fertility ENTER
Screen 4 PMS ENTER
Pregnancy 40 week Tracker ENTER
46c
Average
Predicted Date of Birth
46b
Todays Date
16/08/99
46b
Start Date M/C
14/08/99
46a
Length of Cycle
34 34 34 34 35 34 34 34 34 34
Screen 1/2/3/4/5 ①②③④⑤
Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Week 13
Week 40
BACK
RESET
FORWARD
47a
48
47b
46

Fig. 5e

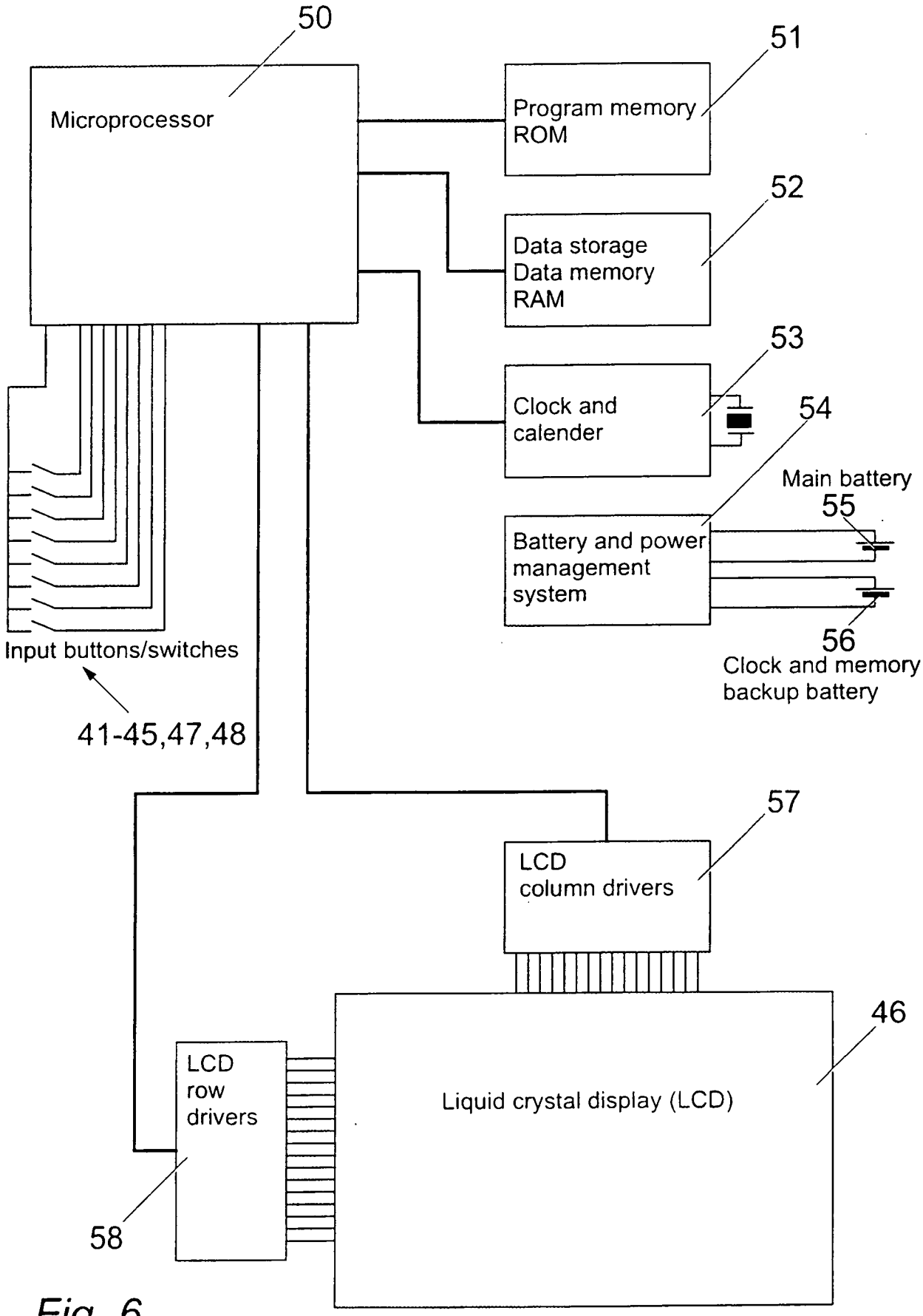
50
Microprocessor
51
Program memory
ROM
52
Data storage
Data memory
RAM
53
Clock and
calender
54
Main battery
55
Battery and power
management
system
56
Clock and memory
backup battery
Input buttons/switches
41-45,47,48
57
LCD
column drivers
46
LCD
row
drivers
Liquid crystal display (LCD)
58

Fig. 6

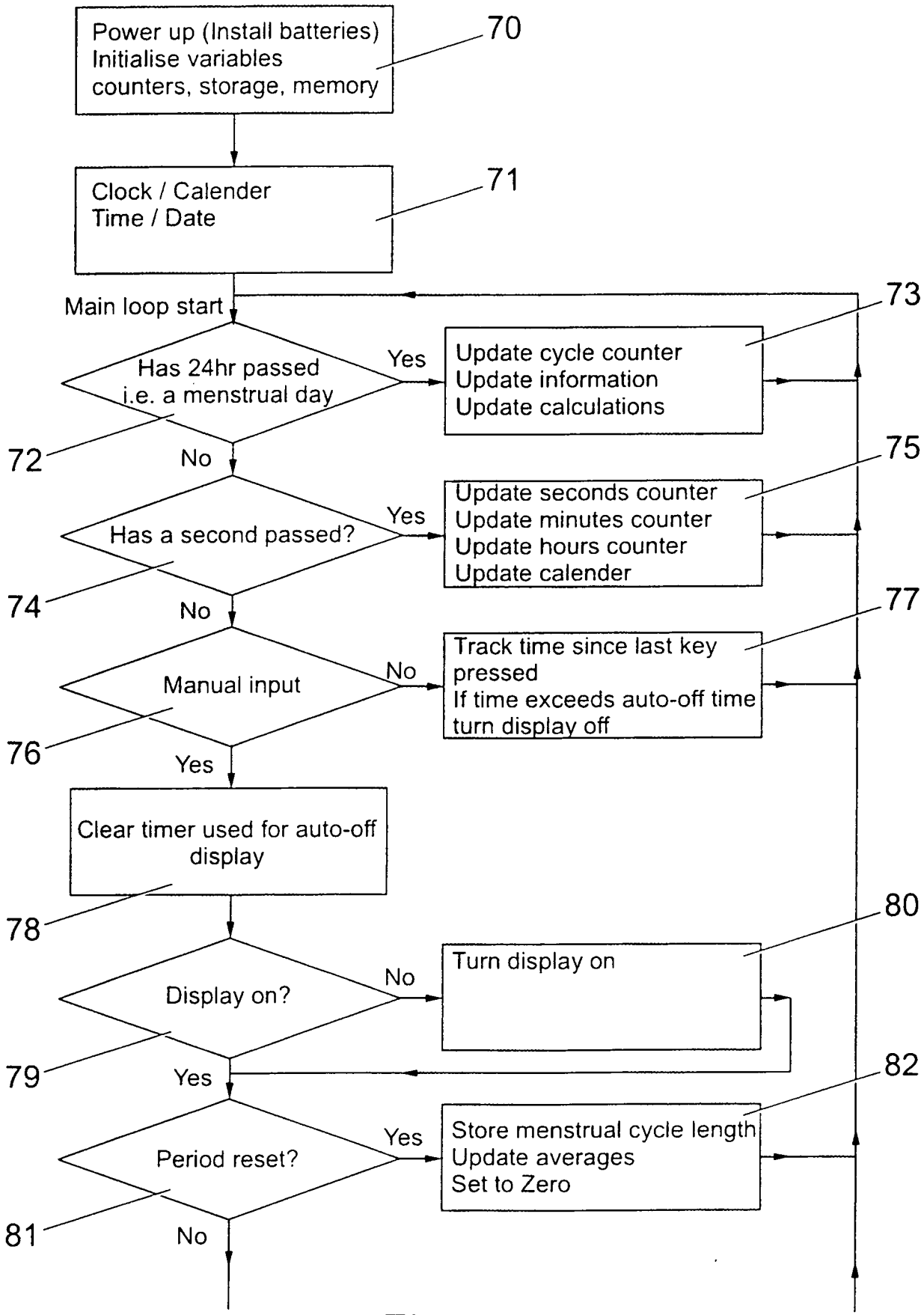
Power up (Install batteries)
Initialise variables
counters, storage, memory
70
Clock / Calender
Time / Date
71
Main loop start
73
Has 24hr passed
i.e. a menstrual day
Yes
Update cycle counter
Update information
Update calculations
72
No
75
Has a second passed?
Yes
Update seconds counter
Update minutes counter
Update hours counter
Update calender
74
No
77
Manual input
No
Track time since last key pressed
If time exceeds auto-off time
turn display off
76
Yes
Clear timer used for auto-off display
78
80
Display on?
No
Turn display on
79
Yes
82
Period reset?
Yes
Store menstrual cycle length
Update averages
Set to Zero
81
No

Fig. 7a

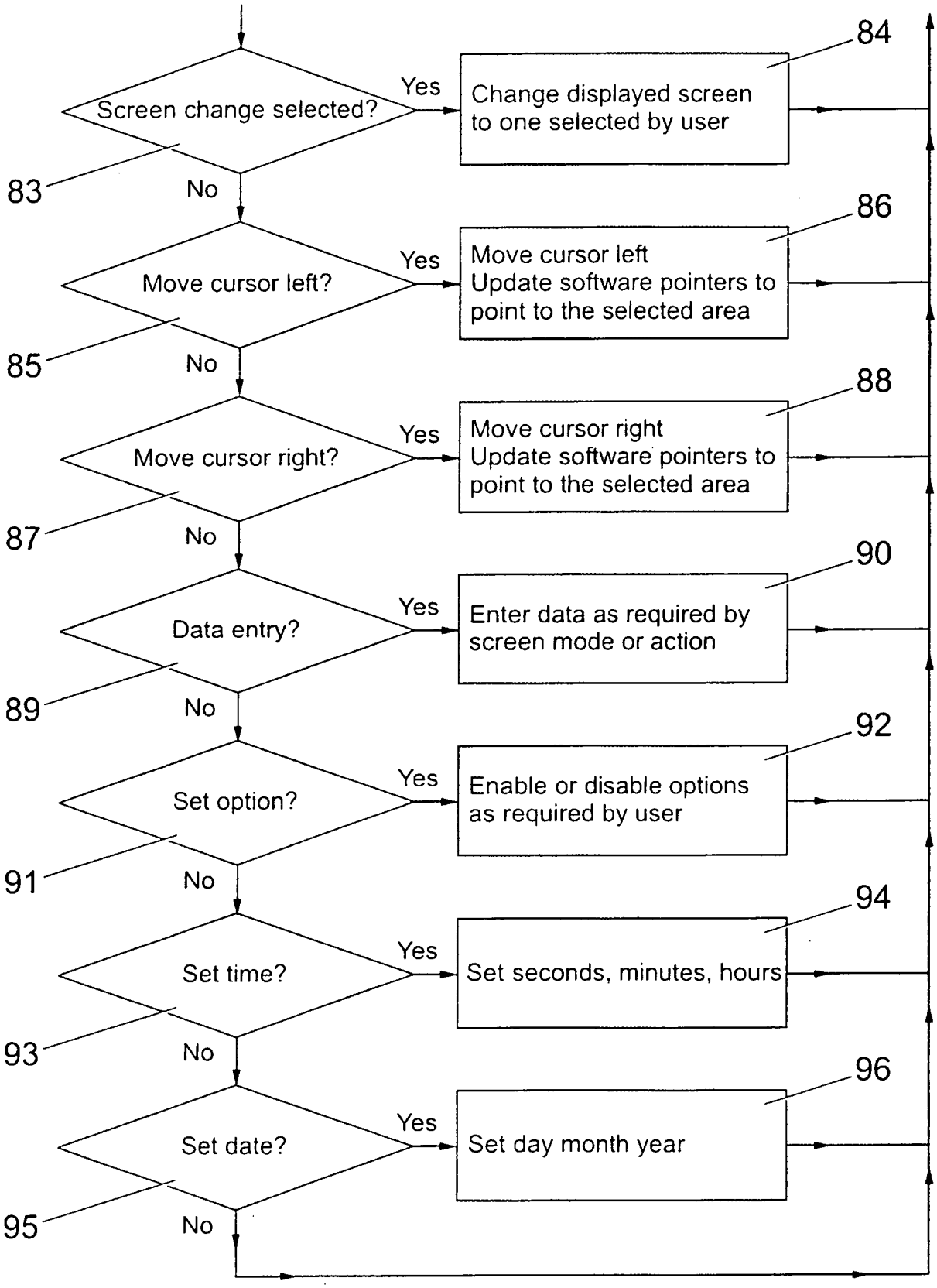
Screen change selected?
Yes
Change displayed screen to one selected by user
84
83
No
Move cursor left?
Yes
Move cursor left
Update software pointers to point to the selected area
86
85
No
Move cursor right?
Yes
Move cursor right
Update software pointers to point to the selected area
88
87
No
Data entry?
Yes
Enter data as required by screen mode or action
90
89
No
Set option?
Yes
Enable or disable options as required by user
92
91
No
Set time?
Yes
Set seconds, minutes, hours
94
93
No
Set date?
Yes
Set day month year
96
95
No

Fig. 7b

INTERNATIONAL SEARCH REPORT

Interr nal Application No
PCT/GB 00/03442

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61B10/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 836 890 A (JACKSON JOSEPH N) 17 November 1998 (1998-11-17) column 2, line 44 - line 67; figure 2A	1-5,7-9, 11,12,17
X Y	US 5 606 535 A (LYNN LYNN) 25 February 1997 (1997-02-25) column 3, line 5 - line 20; figure 1 column 7, line 61 - line 67 column 8, line 42 - line 52	1-4, 8-14, 16-18,20 15
X A	WO 93 07578 A (BIGGEL EMIL JOSEF) 15 April 1993 (1993-04-15) page 6, line 11 - line 20	17,18 1,19

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 December 2000	12/12/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Mayer, E

1

Interr nal Application No
PCT/GB 00/03442

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 515 344 A (NG TAI W) 7 May 1996 (1996-05-07) column 2, line 44 - line 65; figure 2A	1,3,4,8, 9,11,12, 17,18
Y	GB 2 186 977 A (BENYTONE CORP) 26 August 1987 (1987-08-26) page 2, left-hand column, line 10 - line 27; figure 4	15

INTERNATIONAL SEARCH REPORT

...ormation on patent family members

Inter... nal Application No
PCT/GB 00/03442

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		US 6022323 A	08-02-2000
US 5606535 A	25-02-1997	WO 9720256 A	05-06-1997
WO 9307578 A	15-04-1993	EP 0606343 A	20-07-1994
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		CN 1097075 A	04-01-1995
		CN 2190321 U	22-02-1995
		DE 4423206 A	02-02-1995
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		FR 2598503 A	13-11-1987
		US 4771791 A	20-09-1988